

REMARKS

Reconsideration and allowance of the subject application are respectfully requested. Claims 1-19 and 21-25 are now pending, claims 8, 13, and 14 having been withdrawn from consideration as being directed to a non-elected invention. Of the claims under consideration, claims 1, 10, 15, and 19 are independent. In this Reply, Applicants have added new dependent claims 23-25.

Telephone Interview

Applicants appreciate the opportunity granted by the Examiner to conduct a telephone interview on September 4, 2003. During the course of the interview, Applicants' representative and one of the named inventors, Richard Rateick, discussed significant aspects of the claimed invention and stated their position that the applied prior art does not support a case of *prima facie* obviousness. In particular, with regard to independent claim 1, Applicants have stated their position that the prior art does not suggest the use of a cold-heading manufacturing technique as claimed for manufacturing a wear resistant shoe, wherein cold-heading is performed on one end portion of a generally cylindrical blank to radially increase and axially diminish the dimensions of one end portion, and to work harden the one end portion while leaving an opposite end portion dimensionally unchanged and maintaining cold-workability of the opposite end portion.

The Examiner indicated that he would reassess his stated position at least on this issue upon filing a Reply and also suggested that Applicants file a Declaration supporting their position of non-obviousness. For at least the reasons set forth in detail below, Applicants believe that the applied prior art fails to establish *prima facie* obviousness of the claimed invention and, thus, a Declaration is not needed to support patentability of the present claims. In an effort to expedite prosecution of the application, however, Applicants are considering appropriate evidence for such a Declaration and, if appropriate, will file a Declaration as a supplement to this Reply.

Prior Art Rejections

1. § 103 Rejection: Beck - "Cold Heading" - Miller - Rateick, Jr.

Claims 1-6, 9-12, and 15-18 stand rejected under 35 U.S.C. § 103 as allegedly being unpatentable over *Beck et al.* (DE 19652326) in view of cited portions of Metal Handbook, 9th Ed. ("Cold Heading"), and further in view of *Miller* (U.S. Patent 3,890,106) and *Rateick, Jr.* (U.S. Patent 5,728,475, hereinafter "the *Rateick* '475 patent"). This rejection is respectfully traversed.

Applicants appreciate the Examiner's indication that the previous rejection of these claims under 35 U.S.C. § 103 based on the asserted combination of teachings from *Beck*, "Cold Heading," and the *Rateick* '475 patent has been withdrawn and recognize that

the new grounds of rejection is similar to the previous rejection, although relying on the additional teachings from *Miller*. For reasons stated below, Applicants submit that *Miller* fails to make up for the deficiencies of the asserted combination of *Beck*, "Cold Heading," and the *Rateick* '475 patent (assuming these references may be combined, which Applicants do not admit).

Independent claim 1 is directed to a method of manufacturing a wear resistant shoe. The method of claim 1 comprises: cold-heading one end portion of a generally cylindrical blank to radially increase and axially diminish the dimensions of the one end portion, and to work harden the one end portion while leaving an opposite end portion dimensionally unchanged and maintaining cold-workability of the opposite end portion; machining the previously cold-headed one end portion to form a cam engaging portion of said wear resistant shoe; and subsequently cold-working and thereby hardening the opposite end portion.

Thus, as emphasized in the Reply dated April 30, 2003, a feature of the method of manufacturing a wear resistant shoe recited in claim 1 is a step of cold-heading one end portion of a generally cylindrical blank to work harden the one end portion while leaving an opposite end portion dimensionally unchanged and while maintaining cold-workability of the opposite end portion. The opposite end portion is subsequently cold-worked. As described

in the specification at pg. 5, line 4 - pg. 6, line. 18, the cold-heading step achieves work hardening of an end portion 38, which comprises the material making up the balance land 28 and the back flange 34 of the wear resistant shoe, to a substantial depth. In addition, the cold-heading step is performed so as to leave the opposite end portion 40, which comprises material making up the skirt 50, in a dimensionally unchanged and unhardened state. Thus, the skirt portion is maintained in a softened condition until work hardening during the subsequent crimping process, thereby allowing the skirt 50 to be crimped without cracking.

Beck discloses a technique for manufacturing a shoe for an axial piston machine. As described in the previously-submitted partial English translation, *Beck* relies on a forging process to generate an intermediate product 1. In the first embodiment shown in Fig. 1, the forging process results in an intermediate product (i.e., forging) 1 having a recess 10 and an outer contour 2, which is subsequently machined to a finished part contour 3 having a finished recess 10'. The second, third, and fourth embodiments, illustrated in Figs. 2, 3, and 4, respectively, generate forgings for two parts 4.1, 4.2. In the second embodiment of Fig. 2, the intermediate product 1 includes a pair of recesses 10, whereas the embodiments of Fig. 3 and Fig. 4 do not include a formed recess 10, which is subsequently formed by machining.

In all embodiments of *Beck*, however, it is evident that the forging process used to produce the intermediate product 1 would result in substantial work hardening of the portions used to form the "glide face" 14 and the region for forming the recess (i.e., socket region). In other words, there is no apparent attempt in *Beck* to maintain cold-workability of the socket region.

The grounds of rejection acknowledges differences between the forging process of *Beck* and the manufacturing method required by claim 1, but relies on the teachings of "Cold Heading" and *Miller* to conclude that:

[I]t would have been obvious to one of ordinary skill in the art to have made the blank "2" of *Beck* et al by the process of cold heading a generally cylindrical blank because cold heading provides several advantages including leaving almost no waste material and also increased strength due to the cold working (i.e.-work harden).

As discussed in previous Replies, "Cold Heading" describes materials, equipment, characteristics, etc., of cold heading as a forging process. Although this reference describes using cold-heading for manufacturing items such as bolts and rivets, there is no description or suggestion of using cold-heading in the manufacture of a wear resistant shoe, particularly in the manner recited in claim 1. As set forth on page 3 of the Office Action, the rejection relies on *Miller* as suggesting "the desirability of cold forming only a portion of a blank material so that the

underformed portion remains soft for subsequent forming operations."

Regarding *Miller*, Applicants note that the element being manufactured is not a wear resistant shoe of the type claimed. Furthermore, *Miller* describes a process of cold work hardening metallic extrusions (preferably brass), but does not describe a cold-heading process and certainly does not describe or suggest cold-heading for manufacturing a wear resistant shoe in the manner recited in claim 1.

Applicants further submit that neither "Cold Heading" nor *Miller* suggest a modification of the manufacturing technique disclosed by *Beck* that would result in the particular technique for manufacturing a wear resistant shoe recited in claim 1. As mentioned above, the forging process used to make the intermediate product (i.e., forging) 1 of *Beck* would achieve substantial work hardening of the portions used to form the "glide face" 14 and the region for forming the recess (i.e., socket region). Thus, the dies used in the forging embodiments described in *Beck* were not designed to maintain cold-workability of the end portion for the socket region, and any modification of the forging embodiments disclosed by *Beck* to satisfy this feature of the claimed invention would at least require a significantly different die design than those used therein. Particularly considering the lack of concern for

maintaining cold-workability of the end portion for the socket region in *Beck*, it cannot be said that such a re-design of the *Beck* forging process is suggested by the art of record, including the newly-cited *Miller* reference.

There is no objective evidence of record to establish that somehow modifying the manufacturing process of *Beck* to include cold heading would result in an inherent and significant reduction in waste material, particularly to an extent that would more than offset any drawbacks in die redesign cost/complexity, ease of manufacturing, etc. that may result from such a modification. In short, there is no evidence pointing to the modification of *Beck* relied on by the Examiner to assert obviousness of claim 1. Furthermore, it appears that the asserted modification of *Beck* would fundamentally change the manufacturing process described therein, which supports the conclusion that the asserted modification is not obvious. See e.g., MPEP § 2143.01. The Examiner's reliance on the *Rateick* '475 patent does not make up for this fundamental deficiency of the rejection.

To establish *prima facie* obviousness, all claim limitations must be taught or suggested by the prior art and the asserted modification or combination of prior art must be supported by some teaching, suggestion, or motivation in the applied reference or in knowledge generally available to one skilled in the art. *In re*

Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). The prior art must suggest the desirability of the modification in order to establish a *prima facie* case of obviousness. *In re Brouwer*, 77 F.3d 422, 425, 37 USPQ2d 1663, 1666 (Fed. Cir. 1995). It can also be said that the prior art must collectively suggest or point to the claimed invention to support a finding of obviousness. *In re Hedges*, 783 F.2d 1038, 1041, 228 USPQ 685, 687 (Fed. Cir. 1986); *In re Ehrreich*, 590 F.2d 902, 908-09, 200 USPQ 504, 510 (CCPA 1979).

As stated above, Applicants respectfully submit that the reasoning provided to assert a combination of *Beck*, "Cold Heading", *Miller*, and the *Rateick* '475 patent fails to establish *prima facie* obviousness of independent claim 1 or any claim depending therefrom.

Applicants respectfully submit that independent claims 10 and 15, as well as all claims depending therefrom, distinguish over the asserted combination at least based on similar reasoning to that set forth above with regard to claim 1.

In view of the above, Applicants respectfully request reconsideration and withdrawal of the Examiner's rejection under 35 U.S.C. § 103 based on the asserted combination of *Beck*, "Cold Heading", *Miller*, and the *Rateick* '475 patent.

2. § 103 Rejection: Beck - "Cold Heading" - Miller - Rateick, Jr.
- Harada

Claim 7 stands rejected under 35 U.S.C. § 103 as allegedly being unpatentable over *Beck* in view of "Cold Heading", *Miller*, the *Rateick* '475 patent, and *Harada* (JP 56-084468).

As stated on page 7 of the Office Action, the Examiner relies on *Harada* as allegedly teaching incremental features of dependent claim 7. Applicants respectfully submit, however, that the Examiner's reliance on *Harada* fails to make up for the deficiencies of the asserted combination of *Beck*, "Cold Heading", *Miller*, and the *Rateick* '475 patent discussed above with reference to claim 1. Therefore, Applicants respectfully submit that the asserted modification of *Beck* in view of "Cold Heading", *Miller*, the *Rateick* '475 patent, and *Harada* (assuming these references may be combined, which Applicants do not admit) fails to establish *prima facie* obviousness of claim 7, which indirectly depends from claim 1. In view of the above, Applicants respectfully request reconsideration and withdrawal of the Examiner's rejection under 35 U.S.C. § 103 based on the asserted modification of *Beck* in view of "Cold Heading", *Miller*, the *Rateick* '475 patent, and *Harada*.

3. Rateick, Jr. - Davidson

Claims 19-22 stand rejected under 35 U.S.C. § 103 as allegedly being unpatentable over the Rateick '475 patent in view of Davidson (U.S. Patent 4,003,765). This rejection is respectfully traversed.

Independent claim 19 is directed to a method of forming and assembling a piston and wear resistant shoe, the shoe being formed from hardened rod stock. The method of claim 19 comprises: machining a region of the hardened rod stock to form a cam engaging wear resistant surface of the wear resistant shoe; forming a hollow region in one rod stock end portion; annealing the one end portion of the rod stock; and crimping the periphery of the hollow region about a rounded end of the piston rod.

As described in the Background section of the present application, the Rateick '475 patent describes a technique for manufacturing a piston shoe 10 having a skirt/flange area 16 formed to the shape of a piston head 18, a wear surface 12 and back flange 14, which engage and wear on a cam plate 22 and auxiliary cam plate 24, respectively. The technique disclosed in the Rateick '475 patent is not specific to forming and assembling a piston and wear resistant shoe using hardened rod stock as the starting material for forming the shoe. Thus, with reference to claim 19, the Rateick '475 patent does not machine a region of hardened rod stock

to form a cam engaging wear resistant surface of the wear resistant shoe.

The secondary reference, *Davidson*, discloses a technique for heat treating cobalt based alloys. *Davidson* does not relate to a method of forming and assembling a piston and wear resistant shoe. In rejecting independent claim 19, the Examiner asserts on page 8 of the Office Action that:

it would have been obvious to one of ordinary skill in the art to have utilized hardened material, such as that of *Davidson*, as the starting material, because it starts with an increased hardness (thus, providing more wear resistance) while maintaining sufficient ductility to be processed further.

For the *Rateick* '475 patent, however, the manufacturing process described therein is based on using a starting material with cold workability. See e.g., col. 2, lines 14-17, stating that "it is necessary for the piston shoe 10 to be corrosion resistant, compatible with aircraft fuel, provide the desired wear resistance, and provide the cold workability of a portion of the shoe." Thus, although Applicants do not dispute that a hardened starting material has increased hardness over a soft starting material, such a characteristic is deliberately avoided in the starting material for the process of the *Rateick* '475 patent.

At least in view of the above, Applicants respectfully request reconsideration and withdrawal of the Examiner's rejection under 35

U.S.C. § 103 based on the asserted combination of the Rateick '475 patent and Davidson.

Conclusion

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact the undersigned at the telephone number below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

Applicants respectfully petition for a one (1) month extension of time pursuant to 37 C.F.R. §§ 1.17 and 1.136(a). A check in the amount of \$110.00 in payment of the extension of time fee is attached.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

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(Rev. 09/30/03)